

all learning turns the steps of students in the same direction, and a Government which fosters such a policy is deserving of its country. Germany has offered to take upon her shoulders a burden which others shirk, and if this can be achieved to the satisfaction of those concerned, she deserves great praise.

While this no doubt is one view of the situation, it must not be overlooked that Governments, particularly those that do not feel justified in giving support to seismological investigation within their own territory, may hesitate in offering support to such investigation in a foreign State. To suggest that a powerful empire needed 1000l. a year to carry on the proposed work would be wanting in good taste. Neither can it be suggested that delegates at the conference have carried away with them the impression that they are to receive something greater than a *quid pro quo*. Should the proposed convention be ratified, what they may possibly discover is that a birthright has been exchanged for a mess of pottage, and for a period of twelve long years a suzerainty has to be acknowledged. Truly enough the movement is called international, but at the same time it bears the character of absorption and crystallisation at a centre, and it is not every country that will care to add to its neighbour's prestige at the expense of its own, play second fiddle, and pay for the privilege. That seismology will benefit by cooperation there is but little doubt, but whether Germany can carry out what has been proposed, and whether the scheme has been presented in its best form are matters open to discussion.

#### NOTES.

WE are informed that Mr. A. S. le Souef has been appointed director of the zoological garden at Sydney in succession to the late Mr. Catlett. Mr. Dudley le Souef, his elder brother, has been director of the gardens of the Zoological and Acclimatisation Society at Melbourne for several years, and a younger brother is director of the newly established garden at Perth, in Western Australia, so that the three brothers occupy three corresponding positions in the three Australian capitals.

FOR the study of bird migration, Mr. W. Eagle Clarke, assistant keeper in the Natural History Department of the Edinburgh Museum of Science and Art, has obtained permission from the Elder Brethren of Trinity House to spend a month upon the Kentish Knock Lightship, situated off the mouth of the Thames, and about twenty-one miles from the nearest point of land. The position of the vessel affords exceptional opportunities for observing the east to west autumnal movements of birds across the southern waters of the North Sea.

THE meeting this year of the French Association for the Advancement of Science was held at Angers under the presidency of M. Émile Levasseur, who, in his presidential address, dealt with one of those economic questions around which, at the present time, many controversies are being raised. "Wages," said M. Levasseur, "have furnished the material for hundreds of volumes and millions of fugitive leaflets which daily discuss the subject in all civilised countries," and he went on to devote his address to a consideration of three main questions affecting the wage-earner. These may be stated in the following words. "What causes determine the rate of wages?" "Have wages increased?" "Is the wage-earner a permanent factor in the organisation of labour?" In discussing the first question, the president recognised a number of causes for the variations in the rate of wages; among these factors

are the productivity of the worker, the cost of living for the workman and his family, the general prosperity of the country, the special abundance of capital in each industry, the opposition between workers and employers, and political institutions and customs. After examining his second question, M. Levasseur concluded that wages have risen in France and in other civilised countries, and that the cause of it is the growth of riches, the progress of industry, the development of machinery, and the greater individual and collective value of the worker. The grants for scientific research made by the association amount this year to about 760l., and this sum was divided among some fifty recipients, including certain scientific associations as well as men of science.

A REUTER telegram from Buenos Ayres states that severe shocks of earthquake were felt on August 12 at Mendoza. A number of houses and the tower of a church were destroyed.

VESUVIUS is in a state of active eruption. The Rome correspondent of the *Daily Chronicle* says a stream of boiling lava is flowing in a north-easterly direction towards San Giuseppe and the village of Ottajano, and has already reached a length of 800 metres.

A SEVERE hurricane passed over the island of Jamaica during the night of August 10-11, causing serious damage and loss of life. On August 8 the U.S. Weather Bureau notified its local agent at Kingston that a disturbance north-east of Barbados was moving to the north-west over the Windward Islands, and would probably develop a dangerous strength. Little notice, however, was taken of the warning. The storm was most severe in the early morning hours of August 11, and the whole of the eastern and north-eastern half of Jamaica has been desolated by it.

THE preliminary international conference on wireless telegraphy came to an end on August 13. The results of the conference have been embodied in draft regulations for the control of wireless telegraphy which it is proposed to submit to the various Governments concerned. A further conference may then be summoned to enter into an international convention based on these regulations; it is said that Germany intends before long to invite the European sea Powers and the United States to take part in a more general conference with this object. The conclusions at which the delegates at the preliminary conference arrived have not yet been made public.

AN instance of the practical advantages of wireless telegraphy at sea was given by the *Observer* last Sunday. A gentleman crossing to New York by the *Campania* discovered in the middle of the voyage that he had not sufficient money to pay his customs dues on arrival, nor did he know anyone on board from whom to borrow. He remembered, however, that his mother was crossing from New York by the *Lucania*, and the two vessels having got into communication by wireless telegraphy, he transmitted a request to her to pay the purser 10l., asking him to advise the purser of the *Campania* to pay the sum to him. The transaction was successfully accomplished within an hour; it seems that with the spread of wireless telegraphy on ships, all the business that we are accustomed to transact on land will be able to be carried on with equal facility at sea.

AN account of some further experiments on the heat radiating power of radium, carried out by M. Curie in conjunction with Prof. Dewar at the Royal Institution at the time of M. Curie's lecture last June, is given in the *Times* of August 13. The facilities for accurate research at low

temperature which Prof. Dewar has developed at the Royal Institution laboratories enabled some careful experiments to be made. It was found that the heat radiating power of radium bromide is not diminished at the temperature of liquid air, and is actually greater at the temperature of liquid hydrogen. It is stated that the experiments leave no room for doubt that the rate of emission of heat by radium is greater at the temperature of liquid hydrogen than at any temperature from that of liquid air up to that of an ordinary room. The experiments also showed that the radiating power of a salt, or solution of a salt, of radium increases for about a month after its preparation to a maximum at which it then apparently remains stationary.

THE fire which occurred last week on the Paris Metropolitan Railway is probably the most disastrous which has taken place in connection with electric traction. In addition to the sympathy one feels for the unfortunate victims and their relatives, the accident is to be especially regretted as tending to discredit a system of transit which was becoming increasingly popular in this country. But although the fire was apparently started by the fusing of an electric wire, the terrible results which followed can in no way be charged to the account of electric traction, nor indeed to the system of underground railways. So far as one can judge by what is as yet known, there seem to have been serious mistakes made after the fire had been first noticed, and finally a panic resulted with its attendant dangers. But for this the accident might have been followed by little serious result; it is safe to say that in all accidents of this kind the best that any system can do is to safeguard, as far as possible, against the occurrence of a panic, for once this occurs the result is in no way commensurable with the original accident, and whatever precautions for safety may exist they are rendered inoperative.

THE Antarctic relief ship *Terra Nova* will leave Dundee on August 21. The vessel will proceed to Hobart, where she will be joined by the *Morning*. Captain McKay will command the *Terra Nova* and Captain Colbeck the *Morning*. Each vessel will carry instructions in duplicate for Captain Scott, upon whom the supreme command will devolve when communication has been established. A *Globe* correspondent states that the French Antarctic Expedition has sailed from Havre under the leadership of Dr. Charcot. The first task to be undertaken by the expedition will be that of finding the Swedish Antarctic Expedition under Nordenskjöld, which, it is supposed, is fast in the ice off Graham's Land. If Nordenskjöld should be found, then a voyage will be made into the Antarctic Ocean, mainly for purposes of scientific research, as the expedition will not try to establish an "Antarctic record." Dr. Charcot is taking out five men of science, and provisions for twenty-eight months, as the expedition will be absent nearly two years. A Reuter message from Stockholm reports that the Swedish expedition for the relief of Dr. Otto Nordenskjöld's South Polar Expedition sailed from there on August 17 on board the *Frithjof*.

THE recent serious floods in Silesia have raised an interesting point as to the relation between them and deforestation. The rivers which inundated Silesia have their origin in Austria, and it appears from a Berlin message in Monday's *Morning Post* that the Prussian authorities are informed by experts that the overflows are due principally to the deforestation of the Austrian highlands, which have become so barren of timber that the rivers no longer lose

the large quantity of water which the trees formerly absorbed. Prussia has concluded, therefore, that until the Austrian highlands are retimbered the flood danger in Silesia cannot be eradicated, and heavy relief expenditure, such as the 500,000l. just granted, will be wasted.

We learn from *Science* that it is proposed to celebrate the seventieth birthday of Prof. August Weismann, which will occur on January 17, 1904. The committee has decided to have prepared for that time a portrait bust of Prof. Weismann, which shall be deposited at the Zoological Institute of the University of Freiburg with appropriate festivities. It invites cooperation in this undertaking, not only from those who owe scientific stimulus to Prof. Weismann and have been guided by him into zoological activity, but also from all colleagues who desire to join in honouring Prof. Weismann for his work. Contributions may be sent to the Deutsche Bank, Leipzig, for the account of Prof. Zur Strassen, who is treasurer.

THE first International Exhibition of Industrial Art for Metal or Stone Products will be held at St. Petersburg in November next. The exhibition has the object of making the public acquainted with the progress attained by Russian and foreign industry in the artistic finish of metal and stone products.

THE Liverpool School of Tropical Medicine has decided, with the cooperation of the Government of the Congo Free State, to dispatch a trypanosoma expedition to the Congo Free State in September. The objects of the expedition will be to report on the sanitary conditions of Boma, Leopoldville, and other centres visited, and to recommend improvements of existing sanitary conditions; to continue the work of trypanosomiasis, human and animal, including the occurrence and distribution of trypanosoma in the Congo, the carriers of the parasite, and the relation of trypanosoma to sleeping sickness. Major Ross, of the Liverpool School, has received a letter from Major Penton, the principal medical officer of the Sudan, testifying to the success of the measures taken against mosquitoes for the prevention of malaria. Ismailia has been found by Major Penton to be practically free from mosquitoes, and to show a striking improvement as regards malarial fever.

THE committee of the National Physical Laboratory announces that it is prepared to test the accuracy of the pipettes, measuring glasses, and test-bottles used in the Lister-Gerber and other methods of testing milk. The fees charged are very moderate, and in view of the increasing attention that is being bestowed upon our milk supplies, these facilities should be largely made use of.

IN addition to the usual circulars respecting the close seasons for the salmon and other fisheries, the Fishmongers' Company has issued a notice with regard to the opening of the oyster season. It is pointed out that the various oyster beds, pits and layings round the coasts have been inspected, and all those proved to be polluted with sewage have been closed, and no oysters from these places will knowingly be allowed to be sold until they have been proved to be safe and wholesome. The cooperation of the medical and sanitary authorities in this matter is invited.

THE July number of the *Journal of Hygiene* (No. 3, vol. iii.) contains several papers of considerable interest. Drs. Newsholme and Stevenson describe the graphic method of constructing a "life table," and Mr. Hayward gives a new "life table" for England. Dr. Meredith Richards discusses the factors which determine the incidence of infantile diarrhoea, and concludes that artificial feeding and in-

sanitary milk supply are the most important. Dr. Fremlin describes the cultivation of the nitroso-bacterium, and Dr. Durham a new diluting pipette. Dr. Haldane finds that the presence of sulphur in coal-gas is the principal factor in vivifying the air, and Dr. Savage has investigated the relation between the pathogenicity of *bacillus coli* in drinking water and purity. Dr. Graham-Smith describes further researches upon factors which may modify the biological or precipitin test for blood.

DR. ROBERTO BOROLA, of Pavia, contributes to the Lombardy *Rendiconti*, xxxvi. 12, a note on the metric properties of quadric surfaces in non-Euclidean geometry, dealing with circular sections, foci, and confocal and con-cyclic systems of quadrics.

AN interesting extension of the use of Green's functions to the mathematical theory of conduction of heat is given by Prof. H. S. Carslaw, of Sydney, in the *Proceedings* of the Edinburgh Mathematical Society, xxi. The use of Green's functions has hitherto been mainly confined to the theory of the potential, although their use in connection with heat conduction has been mentioned by Minnigerode and Betti. Prof. Carslaw now shows how the functions in question can be obtained by means of contour integrals, and a general method applied to the solution of problems which are usually solved by independent methods.

"RED RAIN" forms the subject of a paper by Messrs. F. Chapman and H. J. Grayson in the *Victorian Naturalist* for June. The occurrence of dust-laden showers is not infrequent in Australia, but one of the most remarkable showers of this kind occurred on February 14 of this year. The writers describe analyses of samples of sediment collected from this shower at Camberwell and St. Kilda, and they compare the substances observed with the minerals contained in the dust commonly present on the roof of the National Museum, Melbourne. A sample collected in a second shower of "red rain" at St. Kilda on March 28 was also examined. The latter sediment was remarkable for the number of diatoms it contained, and the authors enumerate a list of the forms found, including about twenty-five species.

THE coefficient of thermal surface-conductivity across the surface of separation of a solid and a fluid is a quantity the determination of which is of considerable importance, especially in connection with the construction of boilers. In the *Zeitschrift* of the German Engineers' Association, Mr. L. Austin describes experiments made at Charlottenburg on this subject, giving the following results:—From metal to water at the boiling point the resistance is equivalent to a thickness of 1.2 to 2cm. of iron, but is reduced by stirring by an amount equivalent to about 0.75cm. of iron. The resistance increases as the temperature falls, reaching a maximum of 10cm. of iron, which is reduced by 1cm. by stirring. For flow of heat from water to metal, the resistance appears greater than for the reverse flow if the water is undisturbed, and about the same when the water is stirred.

THE *Atti dei Lincei*, xii. 10, contains a brief account of experiments in syntonic wireless telegraphy carried out at Spezia under the direction of the Minister of Marine. At San Vito two Marconi apparatus of frequencies "A" and "B" were connected with the same antenna, and communication was carried on simultaneously with Palmaria and Leghorn at distances of respectively 5 and 70 kilometres.

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In the *Atti dei Lincei*, xii. 11, Prof. G. Agamennone directs attention to an interesting contribution to our knowledge of terrestrial magnetism in the form of a discourse by Father Francesco Eschinardi, published in 1681, in which he makes mention of a sudden change in the magnetic declination at Rome from about 3° to 5° W., which occurred towards the end of October of the previous year. This the writer attributed to the effect of earthquakes in Spain and Malaga.

THE annual list of new garden plants of the year 1902, which is issued as an appendix to the *Kew Bulletin*, has been received.

A RECORD of plants collected in the northern region of Yucatan is commenced in the *Publications* of the Field Columbian Museum. The first fascicle, which treats of the ferns included in the Polypodiaceae and Schizaeaceæ, and the monocotyledonous orders Gramineæ and Cyperaceæ, is the joint work of Mr. C. F. Millspaugh and Miss Chase.

THE question of shade for coffee and cocoa plants is discussed in the *Jamaica Bulletin* of the Department of Agriculture, where it is pointed out that in many cases it is the bacteria working in the soil, and not the plants which require the shade. The choice of leguminous plants for the purpose is a wise one, as the nitrogenous contents of the soil are thereby increased. An article by Mr. Cousins, contrasting the constituents of four definite phosphatic fertilisers, serves to point the absurdity of an indiscriminate application of commercial fertilisers without taking into consideration the nature of the soil.

WHATEVER may be the outcome of the present political question of fiscal reciprocity towards our colonies, there can be no doubt about the advantages of a closer connection between them and the mother country. To further this object a scientific and technical department of the Imperial Institute was established, and a laboratory was provided wherein samples of raw material from the colonies can be analysed and reported upon by experts, as has long been done for vegetable products at Kew. In the second number of the *Bulletin* of the Imperial Institute, there appears an account of recent investigations undertaken by Dr. Dunstan and his assistants. These include the examination of rubbers from Africa, oil shale from Natal, iron ore from a district in the Bombay presidency, and other products. Also there are added special notices on various industries which are receiving attention in our dependencies and those of other European States.

IN vol. ii. of *Marine Investigations in South Africa* Mr. R. Kirkpatrick, of the Natural History Museum, continues his descriptions of the sponges, naming some new genera and species.

THE nature of the so-called terminal buds of fishes—organs scattered over the skin of the head in certain teleosts and ganoids, and at one time regarded as tactile in function—forms the subject of an article by Mr. C. J. Herrick, published in vol. xii. of the *Journal of Comparative Neurology*. It is inferred that these structures have no connection with the lateral line system, but are intimately related to the taste-buds of the mouth.

THE July issue of the *Emu* contains a number of interesting articles devoted wholly, or chiefly, to ornithology. In treating of New Zealand cormorants, Captain F. W. Hutton suggests that one group of these birds reached New Zealand from South America, and that, after considerable modification in the Antipodes, their descendants returned to their ancestral home, whence some found

their way to Kerguelen Island. This, it is argued, indicates that islands were formerly more numerous in the Antarctic than at present. Among the illustrations in the number before us, one plate shows a native high up in a gum-tree taking the nest of the white-tailed cockatoo, and a second the countless swarms of sooty terns which haunt the Great Barrier Reef in the breeding season.

In an article entitled "The Genesis of the Kangaroo," a correspondent of the *Newcastle Daily Journal* of August 4 seeks to obtain credence for a view, current among Australian settlers, as to the early stages of development in these animals. Briefly stated, this view is to the effect that "after impregnation, the mingled germs find their way from the womb, or receptacle answering to such, through a duct or channel straight to the point of the teats," and that consequently the whole of the development takes place while the embryo is attached to the summit of the nipple. Nothing is said with regard to the position of the mysterious duct or channel alluded to in the quotation, while the commonly accepted view, namely, that the mother transfers the embryo from the vagina to the nipple, is dismissed with the statement that this is not supported by direct observation. Apparently the author is unacquainted with a note published some years ago in the *Zoologist* (and referred to in our columns at that time), in which Mr. D. le Souef describes this transference in considerable detail, and states that it is effected solely by the maternal lips.

THE report of the British Museum for the year ending on March 31 last has been published as a Blue-book. In the natural history section the director records an increase in the number of visitors, and likewise in the list of donations. Attention is directed to the completion of the Nile Fish Survey, and to Dr. Andrews's geological explorations in Egypt, funds for which have been generously provided by Mr. W. E. de Winton. It is satisfactory to learn that the whole of the collections to be made by the National Antarctic Expedition are to come to the museum, and that the trustees have agreed to publish an account of the natural history results of the voyage. As regards the new section of economic zoology, a summary is given of work accomplished in advising the Board of Agriculture in regard to insect ravages and kindred subjects, and of visits paid in connection with the Board. A long list of correspondence in connection with mosquitoes and malaria indicates the energy with which these investigations are being pushed. Some progress has been made with the exhibition of economic zoology in the north hall, and collections of insects affecting economic products have been received from various parts of the world.

DR. HENRY HOEK, of Davos, has issued separate copies of a detailed paper on the geological structure of the central "Plessurgebirge" in the neighbourhood of Arosa (*Berichte der Naturforschenden Gesellschaft zu Freiburg-im-Breisgau*). Inspired by Prof. G. Steinmann, the author has sought to work out in detail the complex features of the district, which is well known in its general aspect to visitors to the Engadine. In so doing, he gives considerable credit to the observations of the English geologist, the late Mr. A. V. Jennings. The overfolding and repetition of strata by thrust-faults are well shown in numerous sketches and diagrams, and plate xiv. gives us a broad landscape, with the geology marked out on it in the clear and effective manner of Murchison and the early authors. Dr. Hoek concludes by supporting the views of Steinmann and Jennings in opposition to those of Rothpletz and Lugeon, and affirms that the main range, including the Brügger-

horn and the Hörnli, is a mountain-mass of eastern Alpine type, pushed up from the south-east over a "Vorland" of Flysch. This Flysch, it is argued with reason, is entirely of Cainozoic age, and the mass of older rocks has been pushed across it for a distance of some 4 kilometres.

PROF. L. PLATE's memoir "Über die Bedeutung des Darwin'schen Selectionsprincips," which was reviewed in NATURE of May 16, 1901 (vol. lxiv. p. 49), has reached a second edition. The new edition contains nearly one hundred pages more than were included in the original work, and the words "und Probleme der Artbildung" have been added to the title.

THE sixth edition of Prof. R. Hertwig's "Lehrbuch der Zoologie" has been published by Herr Gustav Fischer, Jena. The work originally appeared in 1891, and was favourably noticed in these columns (vol. xlvi. p. 173). The present edition has been enriched with many new illustrations, and the text has been revised in the light of recent theory and investigation in zoological science.

Two useful volumes have been published by the Treasury Department of the United States Coast and Geodetic Survey. One is a list and catalogue of the publications issued by the survey from 1816-1902, and has been compiled by Mr. E. L. Burchard; the other is a second edition of a bibliography of geodesy, by Prof. J. H. Gore. This bibliography has been carefully revised to 1902, and deals with all books and papers on the subject in every language.

THE "List of Publications of the Smithsonian Institution, 1846-1903," by Mr. William J. Rhees, a copy of which has been received from the institution at Washington, will prove of great assistance to all readers who have access to the volumes indexed. The "list" consists of two parts; the first is a complete list of Smithsonian publications in numerical order, which is also approximately chronological; the second part contains a list of publications, available for distribution, arranged under subjects and authors. In this list are included the papers and addresses by eminent men of science which have appeared in the appendices to the annual reports of the Smithsonian Institution.

THE extension section of the Manchester Microscopical Society has issued a revised list of fifty-four lectures arranged for delivery by its members during the coming winter. The work of lecturing is voluntary and gratuitous on the part of the members, but hire of slides, travelling, and out-of-pocket expenses are charged. The purpose of the lectures is to bring scientific knowledge, in a popular form, before societies unable to pay large fees to professional lecturers, but in all cases where lectures are given before societies which are commercial undertakings, or are subsidised by grants, a fee is charged. The subjects of the lectures are varied and well chosen, and this pioneer work of the Manchester scientific workers deserves wide appreciation.

WE have received a reprint of an article, from vol. ix. of the decennial publications of the University of Chicago, on "New Instruments of Precision from the Ryerson Laboratory," by Mr. R. A. Millikau. The instruments described are a substitute for Atwood's machine, a Young's modulus apparatus, a "moment of inertia" machine, and a vapour-tension device. The pieces of apparatus are ingenious and likely to prove useful in the teaching of practical physics, but two at least can hardly be described as new. The substitute for Atwood's machine is merely a slightly modified form of the familiar smoked glass plate

falling in front of a vibrating tuning fork to which a suitable style is attached. It may interest Mr. Millikau to know that this device has been used by students at the London Royal College of Science for the last twenty years. Similarly the vapour-tension device is an improved form of the bent tube with the shorter limb closed and with mercury in the bend which has long been used in laboratories in this country for the determination of boiling points.

THE additions to the Zoological Society's Gardens during the past week include an Anubis Baboon (*Papio anubis*) from West Africa, presented by Mrs. J. B. Ward; a White-crowned Mangabey (*Cercocebus oethiops*) from West Africa, presented by Mrs. Stevenson; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. F. W. A. Jackson, R.A.; a Black Rat (*Mus rattus*), British, presented by Mr. Oswald M. Courage; six English Vipers (*Vipera berus*) from Dorset, presented by Mr. A. Old; two Slender Loris (*Loris gracilis*) from Ceylon, a Black Hornbill (*Sphagolobus atratus*) from West Africa, three Westerman's Eclectus (*Eclectus westermanni*) from Moluccas, ten Common Skinks (*Scincus officinalis*) from North Africa, deposited; a New Zealand Parrakeet (*Cyanoramphus novae-zealandiae*), a Golden-headed Parrakeet (*Cyanoramphus auriceps*) from New Zealand, purchased; a Garnett's Galago (*Galago garnetti*) from East Africa, a Stanley Crane (*Anthropoides paradisea*) from South Africa, received in exchange.

#### OUR ASTRONOMICAL COLUMN.

THE SPECTRUM OF COMET 1903 c.—On July 14 and 15 Dr. Curtis, of the Lick Observatory, found that the visual spectrum of this comet consisted of a strong continuous spectrum, and the three characteristic cometary bands, that at  $\lambda 4770$  being by far the brightest. He tried to photograph the spectrum by giving a six hours' exposure with the 36-inch telescope, but obtained no result, the intrinsic brightness of the comet being too small.

Prof. Perrine, using a small slit spectrograph with the Crossley reflector, obtained a spectrum with four hours' exposure, and found that it contained the five bands obtained by Campbell in Comet *b* 1893 (Rordame) and in Comet *b* 1894 (Gale), viz. 388, 409, 421, 436 and 473. The bands obtained by Perrine also agree in brightness with those previously photographed, with the exception of that at  $\lambda 420$ , which was one of the brightest bands in the former comets, but is very weak in this one (Lick Observatory *Bulletin*, No. 47).

THE SPECTROSCOPIC BINARY  $\beta$  SCORPII.—Working with the new spectrograph of the Lowell Observatory, Mr. V. M. Slipher has determined that the spectroscopic binary  $\beta$  Scorpii has a very wide range of velocity, extending over 250 km. from -100 km. to +146; these variations are satisfied by a period of 6d. 21h.

The spectrum of each of the components is of the Orion type, and the velocity determinations were made from measurements of the lines H $\gamma$ ,  $\lambda 4388$ , and  $\lambda 4472$  (Lowell Observatory *Bulletin*, No. 1).

EFFECTS OF ABSORPTION ON THE RESOLVING POWER OF SPECTROSCOPES.—In a mathematical discussion of the manner in which the absorption of a train of prisms affects the resolving power of a spectroscope, Prof. Wadsworth, of the Allegheny Observatory, has found that for small absorption values the actual resolving power is practically identical with its theoretical value, but as the absorption increases a most important diminution of the resolving power takes place. So rapid is this diminution that in several actual instruments now in use, which were designed to give great resolution, this end has been defeated by the high absorptive power of the dense flint prisms used in their prism-trains. Thus in the Young spectroscope, the theoretical resolving power in the neighbourhood of the

H and K lines is 300,000, whilst the practical power is only about 57,000, actually less than that which an instrument one-fourth the size would possess.

Prof. Wadsworth summarises the results of his discussion in the following statements. "It is at once evident from these results that if high-power prism spectrosopes are to be used in the investigation of the photographic region of the spectrum, the use of extra dense flint glass, so commonly employed in the past, must be avoided, not only on the score of light-efficiency, but, as now appears, on the score of photographic resolving power and purity as well. The use of lighter flint reduces the theoretical resolving power of any given prism train by decreasing the value of the dispersion coefficient, but this may be easily, and even advantageously, compensated by increasing the refracting angle of the prisms."

Many new spectrosopes have been designed on the principle enunciated above, amongst others those of the Allegheny, Lowell, and Philadelphia Observatories may be mentioned (*Miscellaneous Scientific Papers* of the Allegheny Observatory, No. 11).

A NEW CIRCUMZENITHAL APPARATUS.—A novel apparatus for determining zenith distances has been devised by Fr. Nušl and M. J. J. Frič, of Prague, and is described and illustrated in a *Bulletin International de l'Académie des Sciences de Bohême*.

The accompanying diagram shows the essential features of the apparatus. When the star E approaches the altitude  $180-\alpha$  it forms, at the focus of the telescope O, two images, one of which has been reflected directly from the face AC of the prism ACB, the other from the face CB after reflection from the surface of a bath of mercury HH; these two images coalesce at the moment that the star crosses the zenith circle at altitude  $180-\alpha$ , and that moment is chronographically recorded.

Numerous improvements have been made on the original design, the chief of which consists in substituting two mirrors inclined to each other at the angle  $\alpha$  in place of the prism shown here, and, by inserting small prisms, the star images are observed as sharply defined horizontal lines. Using a telescope of 350mm. focal length and 40mm. aperture, with a 50 eye-piece, a determination of time correct to  $\pm 0.055\text{--}0.06$ s. may be made, and by observations of three stars a determination of latitude correct to  $\pm 0''.22$  is easily performed.

THE SECCHI COMMEMORATION.—The twenty-fifth anniversary of the death of Padre Angelo Secchi was commemorated at the Collegio Romano last spring, when an address was read by Prof. Elia Millosevich. This has since been published, with a portrait of Secchi, by the Press of the Lincei Academy.

#### THE NEW YORK ZOOLOGICAL SOCIETY.<sup>1</sup>

ALTHOUGH the preservation of the native animals of the United States is one of the avowed objects of the New York Zoological Society, the establishment of small parks, where the larger species can live and multiply under conditions approximating as nearly as may be to their natural surroundings, has been specially undertaken by the sister society at Washington. And, so far as we gather from the report before us, the authorities at New York are directing their attention to the exhibition of animals from all parts of the world on an equal footing. Considering that the year (1902) to which the report relates is only the fourth

<sup>1</sup> "Seventh Annual Report of the New York Zoological Society." Pp. 205; illustrated. (New York, 1903.)